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## **PATENT ABSTRACTS OF JAPAN**

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(21)Application number : **08-262756** (71)Applicant : **HITACHI LTD**

(22)Date of filing : **03.10.1996** (72)Inventor : **SAKAI TAKASHI**

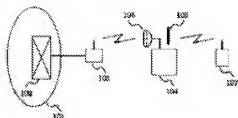
**SUZUKI TOSHIRO**

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(54) **RADIO RELAY SYSTEM**

(57) Abstract:

PROBLEM TO BE SOLVED: To prevent the number of radio channels used by other radio terminal equipments by avoiding occurrence of radio wave interference even when a repeater uses a transmission reception antenna for base station communication and transmission reception antenna for terminal equipment communication in common.



SOLUTION: A radio repeater 104 includes at least a 1st antenna 105 to send a radio wave to a radio base station 103 and a 2nd antenna 106 to send a radio wave to a terminal equipment 107. In the case of communication with the radio base station 103, the 1st antenna 105 is used and in the case of communication with the radio terminal equipment 107, the 2nd antenna 106 is used, and an arrival range of a radio wave in the case of communication from the repeater by the 1st antenna 105 is differentiated from an arrival range of a radio wave in the case of communication from the repeater by the 2nd antenna 106. Thus, the influence of the frequency and the transmission slot used for the communication with the radio terminal equipment 107 onto other radio base stations is reduced.

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## CLAIMS

[Claim(s)]

[Claim 1] A radio relay system comprising:

A communications network.

A switchboard connected to said communications network.

A base transceiver station which is connected to said switchboard and has two or more radio channels.

A radio terminal which communicates with said base transceiver station, and a radio repeater which is provided with an exclusive use antenna for base stations, and an exclusive use antenna for radio terminals at least, and relays communication of said radio terminal to said base transceiver station, A means to prepare for said radio repeater and to establish a wireless circuit with said base transceiver station using an exclusive use antenna for said radio place offices, and a means to establish a wireless circuit with said radio terminal using an exclusive use antenna for said radio terminals with which said radio repeater is equipped.

[Claim 2] A communications network, a switchboard connected to said communications network, and a base transceiver station which is connected to said switchboard and has two or more radio channels, A radio terminal which communicates with said base transceiver station, and a translator which relays communication of a radio terminal to said base transceiver station, Form two or more antennas in an implication and said translator, and said two or more antennas in distinction from an exclusive use antenna for base stations, and an exclusive use antenna for radio terminals Every transmission slot. A radio relay system communicating by having a function which changes an exclusive use antenna for said base stations, and an exclusive use antenna for said radio terminals for every receiving slot.

[Claim 3] A range of access of an electric wave when it communicates with an exclusive use antenna for said base stations from said translator in Claim 1 thru/or the radio relay system according to claim 2, A radio relay system, wherein a range of access

of an electric wave when it communicates with an exclusive use antenna for said radio terminals from said translator communicates by selecting the directivity of two or more of said antennas so that it may differ.

[Claim 4] A range of access of an electric wave when it communicates with an exclusive use antenna for said base stations from said translator in Claim 1 thru/or the radio relay system according to claim 2, A radio relay system, wherein a range of access of an electric wave when it communicates with an exclusive use antenna for said radio terminals from said translator communicates by selecting a fixing position of two or more of said antennas so that it may differ.

[Claim 5] In Claim 1 thru/or the radio relay system according to claim 2, a communication slot of said base transceiver station and said radio repeater is determined first, A radio relay system continuing, assigning a communication slot of said radio terminal and said radio repeater, continuing, determining timing of said antenna switch, and communicating by changing an exclusive use antenna for said base stations, and an exclusive use antenna for said radio terminals to said timing.

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[Translation done.]

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]In radio, when the invention in this application communicates with a base transceiver station with a radio terminal, it relates to the radio relay system which uses a translator and performs this communication.

[0002]

[Description of the Prior Art]In PHS (Personal Handy PhoneSystem: personal handy phone system) which is a kind of a cellular phone. The transmission output of a terminal has adopted the microcellular of an average of 10 mW and frequency 1.9 GHz band, and the area per base station which can be talked over the telephone is about several 100-meter system. On the other hand, if the operating environment of a cellular phone is taken into consideration, indoors, in call enable area, attenuation of an electric wave will be large the very limited place around a base station with 1.9 GHz bands for cover by a building.

[0003]Then, in order to mainly aim at expansion of the call area in indoor etc., the technique of using a radio repeater is generally adopted.

[0004]

[Problem to be solved by the invention]Conventionally, it faced using the radio repeater with mobile communication systems, such as PHS, and there was a case where the transmitting antennas used for communication with a base station and the transmitting antennas used for communication with a terminal were shared. Since the frequency band assigned to a PHS terminal and the frequency band used at the time of the transmission to a base station from a relay station are the same when starting, the radio channel which radio wave interference produces and can be used with other radio terminals as a result decreases, and SUBJECT that decline in radio-channel utilization efficiency is caused occurs.

[0005]When similarly the number of users increases and traffic increases, SUBJECT that the radio terminal whose communication becomes impossible by restriction of using frequency increases occurs.

[0006]

[Means for solving problem]In order to solve said SUBJECT, the composition of invention concerning the radio relay system of the invention in this application, The base transceiver station 103, the radio terminal 107, and said base transceiver station 103 and said radio terminal 107 are provided with the radio repeater 104 used for radio, and it the above-mentioned radio repeater 104, Provide two or more antennas and the first antenna 105 that transmits an electric wave to said base transceiver station 103, and the second antenna 106 that transmits an electric wave to said radio terminal are included at least, A means 405, 407 to use said second antenna 106 when performing communication with the base transceiver station 103 and performing communication with the radio terminal 107 using said first antenna 105, The directivity of said first antenna and the directivity of said second antenna are made into mutually different directivity, Or Mukai of said first antenna and direction of said second antenna are turned in the different direction, The means 407 it is made to differ in the range of access of an electric wave when it communicates with said second antenna from the range of access and said translator of a last electric wave when it communicated with said first antenna from said translator is used, The frequency used for communication with this radio terminal and a transmission slot become possible [ reducing the influence of the base transceiver station on others ].

[0007]

[Mode for carrying out the invention]Hereafter, each embodiment concerning the invention in this application is described using figures.

[0008]First, a first embodiment of the invention in this application is described.

[0009]In a radio repeater, a first embodiment forms a different antenna of two or more directivity, controls each, and enables reduction of the radio wave interference to other base transceiver stations and radio terminals.

[0010]Drawing 1 is the first composition and key map in an embodiment.

[0011]the inside of a figure, and 101 -- the existing communications network and 102 -- a radio repeater and 105 show the first antenna, 106 shows the second antenna, and, as for a base transceiver station and 104, a switchboard and 103 show the radio

terminal 107. Here, a cellular phone, PHS, etc. are raised as a typical thing of the radio terminal 107.

[0012]In drawing 1, via the switchboard 102, the base transceiver station 103 is connected to the existing communications network 101, and the radio terminal 107, A radio signal is transmitted and received between the radio repeaters 104, and the radio repeater 104 can transmit and receive a radio signal between the base transceiver stations 103, and can connect the radio terminal 107 with the existing communications network as a result.

[0013]In drawing 1, the radio repeater 104 chooses and uses the first antenna 105, when communicating with the base transceiver station 103, and when communicating with the terminal 107, it chooses and uses the second antenna 106.

[0014]Next, the composition of the radio terminal 107, the radio repeater 104, and the base transceiver station 103 is explained using drawing 2, drawing 3, and drawing 4.

[0015]Drawing 2 is a block diagram showing the composition of the radio terminal 107.

[0016]Drawing 3 is a block diagram showing the composition of the base transceiver station 103.

[0017]Drawing 4 is a block diagram showing the composition of the radio repeater 104.

[0018]The radio terminal 107 shown in drawing 2. The speaker 201 and the microphone 202, It has the audio coding section 203, the channel codec part 204, the modulation part 205, the demodulation section 206, the high frequency (RF) part 207, the antenna 208, the bus 209, the control section 210, the storage parts store 211, the display 212, and the key pad 213, and is constituted.

[0019]Although the fundamental composition of the base transceiver station 103 shown in drawing 3 is equivalent to the terminal 107, having the circuit 301 and the circuit interface part 302 differs from the display 212 and the keypad 213 being excluded further instead of being the speaker 201 and the microphone 202.

[0020]Although fundamental composition is equivalent to the terminal 107 and the base station 103, the radio repeater 104 shown in drawing 4 has two or more antennas of the first antenna 105 and the second antenna 106, and possesses the antenna changeover



switch 405 further.

[0021]The radio repeater 104 communicates using the control section 407 by performing control which changes the antenna changeover switch 405 to the first antenna 105 at the time of communication with the base transceiver station 103. It communicates by performing control which changes the antenna changeover switch 405 to the second antenna 106 at the time of communication with the radio terminal 107.

[0022]Drawing 5 shows a frame structure for explaining communication timing and antenna switch timing of a radio repeater.

[0023]In a communications system concerning this embodiment, a frame used as a fundamental period of transmission of a signal or reception is defined. With a time division multiple access (TDMA (time division multiple access) is called below.) correspondence procedure which assigns inside of a frame at some time (slot), and enables it to communicate mutually. While the base transceiver station 103 and the radio repeater 104, it communicates between the radio repeater 104 and the radio terminal 107. .

[0024]In this embodiment, a sending signal and an input signal shall communicate with what is called a TDD (time division duplex) correspondence procedure assigned into one frame.

[0025]In this embodiment, it takes up about a case where it comprises a total of eight slots of transmitting 4 slot and receiving 4 slot in one frame as shown in drawing 4.

[0026]In drawing 5, the frame 501 comprises the transmission slot group 202 and the receiving slot group 503. Furthermore, a transmission slot group comprises transmission slot A (502a) - receiving slot D (502d), and the receiving slot group 503 comprises receiving slot A (502a) - receiving slot D (503d), etc.

[0027]Now, when the radio repeater 104 communicates with the base transceiver station 103 and the transceiver slot A (502a and 503a) is used, Just before the control section 407 of a radio repeater recognizes base station ID beforehand given to the base transceiver station 103 and the control section 407 uses this slot, the antenna changeover switch 405 is changed to the first antenna 105 side, and it points to it,

and it communicates using the antenna 105.

[0028] If the control section 407 of a radio repeater recognizes terminal ID beforehand given to the radio terminal 103 when it continues and the radio repeater 104 communicates with the radio terminal 107, and using the transceiver slot C (502c and 503c), just before the control section 407 uses this slot, the antenna changeover switch 405 is changed to the second antenna 106 side, and it points to it, and it communicates using the antenna 106. Drawing 6 is a flow chart which shows the deciding method of antenna switch timing.

[0029] When starting communication, an antenna changeover switch is set to the antenna side for base transceiver stations (601), and a synchronization with a base transceiver station is established (602). At this time, a transceiver slot for base transceiver stations is determined (603). Next, timing of an antenna switch for base transceiver stations is determined just before a transceiver slot for base transceiver stations (604). Slots other than a transceiver slot for base stations are determined as a transceiver slot for terminals (605). Finally, timing of an antenna switch for radio terminals is determined just before a transceiver slot for radio terminals (606).

[0030]

[Effect of the Invention] As explained above, according to the invention in this application, a radio repeater becomes possible [ preventing decline in the frequency utilization efficiency by interference etc. by providing two antennas the object for base transceiver stations, and for radio terminals, and accommodating more members in the same area ], and improvement in communication efficiency has a big effect.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]It is a block diagram of the radio relay system of the embodiment of the invention in this application.

[Drawing 2]It is a block diagram of the radio terminal of the invention in this application.

[Drawing 3]It is a block diagram of the base transceiver station of the invention in this application.

[Drawing 4]It is a block diagram of the radio repeater of the invention in this application.

[Drawing 5]It is a frame structure figure of the invention in this application.

[Drawing 6]It is a figure showing the flow chart of the antenna switch timing determination of the invention in this application.

[Explanations of letters or numerals]

101 -- The existing communications network

102 -- Switchboard

103 -- Base transceiver station

104 -- Radio repeater,

105 -- The first antenna

106 -- The second antenna

107 -- Radio terminal

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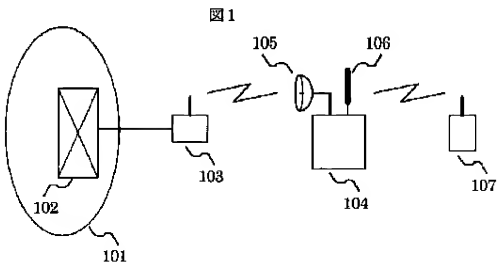
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## DRAWINGS

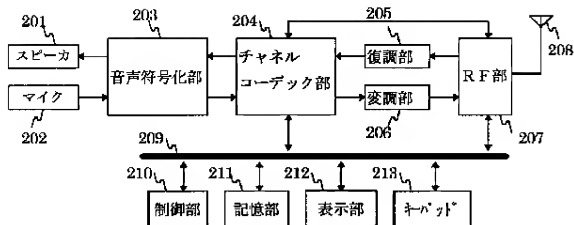
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[Drawing 1]



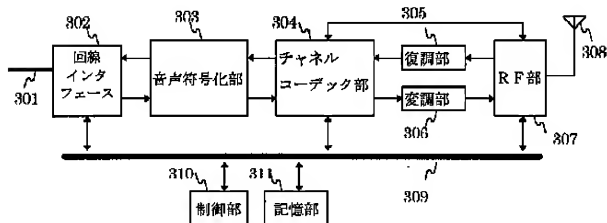
[Drawing 2]

図 2



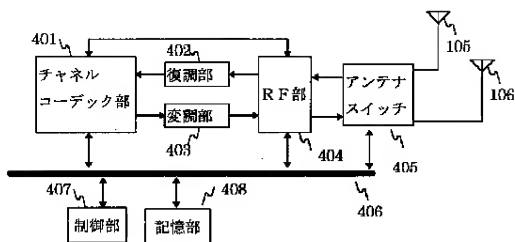
[Drawing 3]

図 3



[Drawing 4]

図 4



[Drawing 5]

図 5

501 送受信フレーム構成

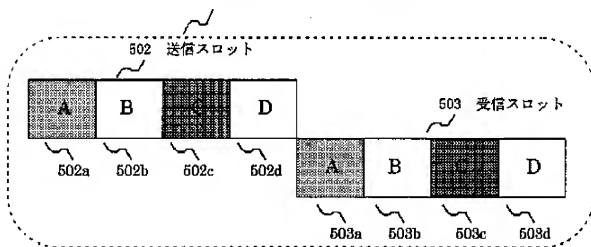
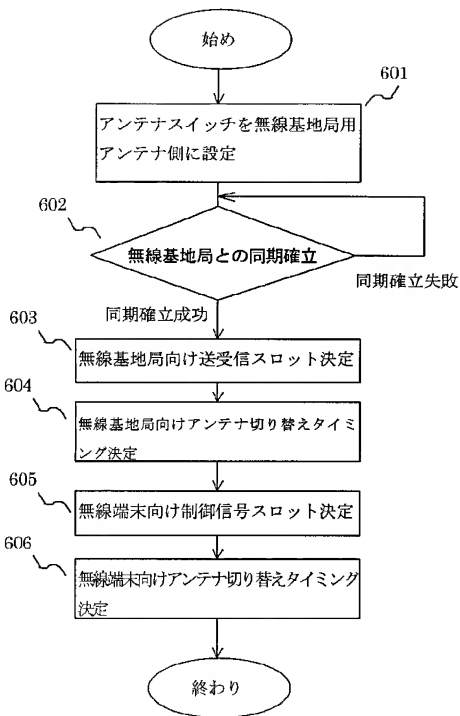


図 6



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(72)Inventor : SAKAI TAKASHI  
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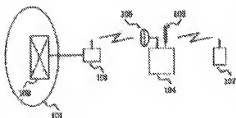
## (54) RADIO RELAY SYSTEM

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To prevent the number of radio channels used by other radio terminal equipments by avoiding occurrence of radio wave interference even when a repeater uses a transmission reception antenna for base station communication and transmission reception antenna for terminal equipment communication in common.

**SOLUTION:** A radio repeater 104 includes at least a 1st antenna 105 to send a radio wave to a radio base station 103 and a 2nd antenna 106 to send a radio wave to a terminal equipment 107. In the case of communication with the radio base station 103, the 1st antenna 105 is used and in the case of communication with the radio terminal equipment 107, the 2nd antenna 106 is used, and an arrival range of a radio wave in the case of communication from the repeater by the 1st antenna 105 is

differentiated from an arrival range of a radio wave in the case of communication from the repeater by the 2nd antenna 106. Thus, the influence of the frequency and the transmission slot used for the communication with the radio terminal equipment 107 onto other radio base stations is reduced.





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審査請求 未請求 請求項の数5 O.L (全 6 頁)

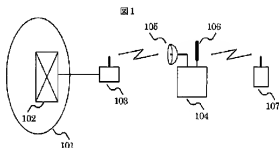
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(54) 【発明の名称】 無線中継システム

(57)【要約】 (修正有)

【課題】中継器において、基地局通信用送受信アンテナと、端末通信用送受信アンテナとを共用すると、電波干渉の問題が生じ、他の無線端末で使用できる無線チャネルが減少する。

【解決手段】無線中継器104は、無線基地局103に電波を送信する第一のアンテナ105と無線端末107に電波を送信する第二のアンテナ108を少なくとも含み、無線基地局103との通信を行う場合は第一のアンテナ105を用い無線端末107との通信を行う場合は第二のアンテナ108を用い、中継器から第一のアンテナで通信した時の電波の到達範囲と中継器から第二のアンテナで通信した時の電波の到達範囲が異なるようにし、無線端末との通信に使用する周波数と送信ルートが、他の無線基地局への影響を低減することが可能となる。



【特許請求の範囲】

【請求項1】通信網と、前記通信網に接続される交換機と、前記交換機に接続され複数の無線チャネルを有する無線基地局と、前記無線基地局と通信を行う無線端末と、少なくとも基地局向け専用アンテナと無線端末向け専用アンテナとを備え前記無線基地局と前記無線端末との通信を中継する無線中継器と、前記無線中継器に備えられ前記無線基地局向け専用アンテナを用い前記無線基地局との無線回線を確立する手段と、前記無線中継器に備えられる前記無線端末向け専用アンテナを用い前記無線端末との無線回線を確立する手段とを備えることを特徴とする無線中継システム。

【請求項2】通信網と、前記通信網に接続される交換機と、前記交換機に接続され複数の無線チャネルを有する無線基地局と、前記無線基地局と通信を行う無線端末と、前記無線基地局と無線端末との通信を中継する中継器と、をふくみ、前記中継器にアンテナを複数設け、前記複数のアンテナを基地局向け専用アンテナと無線端末向け専用アンテナと区別し、送信スロット毎と、受信スロット毎とに、前記基地局向け専用アンテナと前記無線端末向け専用アンテナを切り替える機能を有し、通信を行うことを特徴とする無線中継システム。

【請求項3】請求項1ないし請求項2記載の無線中継システムにおいて、前記中継器から前記基地局向け専用アンテナで通信した時の電波の到達範囲と、前記中継器から前記無線端末向け専用アンテナで通信した時の電波の到達範囲とが、異なるように前記複数のアンテナの指向性を選定し、通信を行うことを特徴とする無線中継システム。

【請求項4】請求項1ないし請求項2記載の無線中継システムにおいて、前記中継器から前記基地局向け専用アンテナで通信した時の電波の到達範囲と、前記中継器から前記無線端末向け専用アンテナで通信した時の電波の到達範囲とが、異なるように前記複数のアンテナの取り付け位置を選定し、通信を行うことを特徴とする無線中継システム。

【請求項5】請求項1ないし請求項2記載の無線中継システムにおいて、前記無線基地局と前記無線中継器との通信スロットを始めて決定し、ついで、前記無線端末と前記無線中継器との通信スロットを割り当て、ついで、前記アンテナ切り替えのタイミングを決定し、前記タイミングで、前記基地局向け専用アンテナと前記無線端末向け専用アンテナを切り替え、通信を行うことを特徴とする無線中継システム。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、無線通信において、無線基地局と、無線端末と通信を行う際に、中継器を用い該通信を行う無線中継システムに関する。

【0002】

【従来の技術】携帯電話の一種であるPHS(Personal Handy Phone System:パーソナル・ハンディ・フォン・システム)では、端末の送信出力が平均10mW、周波数1.9GHz帯のマイクロセラーを採用しており、基地局当たりの通話可能エリアが数100メートルほどのシステムである。一方、携帯電話の使用環境を考慮すると、屋内では、建物による遮蔽のため、1.9GHz帯では電波の減衰が大きき通話可能エリアは、基地局周辺の極限られた場所となってしまう。

【0003】そこで、主に屋内等における通話エリアの拡大を図るために、無線中継器を用いる手法が一般的に採用されている。

【0004】

【発明が解決しようとする課題】従来、PHSなどの移動通信システムで無線中継器を用いるに際し、基地局との通信に使用される送受信アンテナと、端末との通信に用いられる送受信アンテナとを共用する場合があった。係る場合に、PHS端末に割り当てられる周波数帯域と、中継器から基地局への送信時に使用される周波数帯域が同一であるため、電波干渉が生じ、その結果、他の無線端末で使用できる無線チャネルが減少し無線チャネル利用効率の低下を招くといった課題がある。

【0005】同様に、利用者の数が増え、トラフィックが増加した場合には、使用周波数の制限により通信不可能となる無線端末が増加するという課題がある。

【0006】

【課題を解決するための手段】前記課題を解決するために、本願発明の無線中継システムに係わる発明の構成

は、無線基地局103と、無線端末107と、前記無線基地局103と前記無線端末107が無線通信に使用する無線中継器104とを備え、上記無線中継器104は、複数のアンテナを具備し、前記無線基地局103に電波を送信する第一のアンテナ105と前記無線端末に電波を送信する第二のアンテナ106を少なくとも含み、無線基地局103との通信を行う場合は前記第一のアンテナ105を用い無線端末107との通信を行う場合は前記第二のアンテナ106を用いる手段405、407と、前記第一のアンテナの指向性と前記第二のアンテナの指向性は互いに異なる指向性とし、あるいは、前記第一のアンテナの方向と前記第二のアンテナの向きを異なる方向に向け、前記中継器から前記第一のアンテナで通信した時の前電波の到達範囲と前記中継器から前記第二のアンテナで通信した時の電波の到達範囲が異なるようにする手段407とを用い、該無線端末との通信に使用する周波数と送信スロットが、他の無線基地局への影響を低減することが可能となる。

【0007】

【発明の実施の形態】以下、本願発明に係る各実施形態を、図を用いて説明する。

【0008】まず、本願発明の第一の実施形態について説明する。

【0009】第一の実施形態は、無線中継器において、複数の指向性の異なるアンテナを設け、それぞれを制御し、他の無線基地局や無線端末への電波干渉の低減を可能とするものである。

【0010】図1は第一の実施形態における構成および概図である。

【0011】図中、101は既存通信網、102は交換機、103は無線基地局、104は無線中継器、105は第一のアンテナ、106は第二のアンテナ、107は無線端末を示している。ここで、無線端末107の代表的なものとしては、携帯電話、PHS等があげられる。

【0012】図1において、無線基地局103は、交換機102を介して、既存通信網101に接続されており、無線端末107は、無線中継器104との間で無線信号を送受信し、無線中継器104は、無線基地局103との間で無線信号を送受信し、結果として、無線端末107は、既存通信網と接続することができる。

【0013】また図1において、無線中継器104は、無線基地局103と通信を行う場合には第一のアンテナ105を選択し使用し、端末107と通信を行う場合には第二のアンテナ106を選択し使用するものである。

【0014】次に、図2、図3及び図4を用いて、無線端末107と無線中継器104及び無線基地局103の構成について説明する。

【0015】図2は、無線端末107の構成を示すブロック図である。

【0016】図3は、無線基地局103の構成を示すブロック図である。

【0017】図4は、無線中継器104の構成を示すブロック図である。

【0018】図2に示される無線端末107は、スピーカ201と、マイク202と、音声符号化部203と、チャネルコーデック部204と、変調部205と、復調部206と、高周波(RF)部207と、アンテナ208と、バス209と、制御部210と、記憶部211と、表示部212と、キーパッド213とを備え構成されている。

【0019】図3に示される無線基地局103は、基本的な構成は、端末107と同等であるが、スピーカ201、マイク202の代わりに、回線301と回線インターフェース部302を有していること、さらに、表示部212とキーパッド213が省かれていることが異なっている。

【0020】図4に示される無線中継器104は、基本的な構成は、端末107、基地局103と同等であるが、第一のアンテナ105と第二のアンテナ106の複数のアンテナを有し、さらにアンテナ切り替えスイッチ405を具備する。

【0021】無線中継器104は、制御部407を用い無線基地局103との通信時には、アンテナ切り替えスイッチ405を第一のアンテナ105に切り替える制御をおこない通信を行う。また無線端末107との通信時にはアンテナ切り替えスイッチ405を第二のアンテナ106に切り替える制御をおこない通信を行う。

【0022】図5は、無線中継器の通信タイミングとアンテナ切り替えタイミングを説明するためのフレーム構成を示す。

【0023】本実施形態に係る通信システムでは、信号の送信あるいは受信の基本周期となるフレームを定め、フレーム内をいくつかの時間(スロット)に割り当てて、相互に通信を行えるようにする時分割多元接続(以下TDMA(タイム・ディビジョン・マルチプル・アクセス)と称す。)通信方法によって、無線基地局103と無線中継器104との間で、また無線中継器104と無線端末107との間で通信を行う。

【0024】さらに、本実施形態では、送信信号と受信信号が一フレーム中に割り当てられる、いわゆるTDMA(タイム・ディビジョン・デュプレックス)通信方法によって通信を行うものとする。

【0025】図4に示されているように、本実施形態では、1フレームの中に、送信スロット、受信スロットの計8スロットで構成されている場合について取り上げる。

【0026】図5において、フレーム501は、送信スロット群202、受信スロット群503から構成され、さらに送信スロット群は送信スロットA(502a)～受信スロットD(502d)で構成され、受信スロット群503は受信スロットA(503a)～受信スロットD(503d)などで構成されている。

【0027】さて、無線中継器104は、無線基地局103と通信を行う際、送受信スロットA(502a及び503a)を使用する場合、無線基地局103に予め与えられている基地局IDを無線中継器の制御部407が認識し、制御部407がこのスロットを使用する直前に、アンテナ切り替えスイッチ405を第一のアンテナ105側に切り替え指示し、アンテナ105を用いて通信を行う。

【0028】ついで、無線中継器104が無線端末107と通信を行う際、送受信スロットC(502c及び503c)を使用する場合、無線端末103に予め与えられている端末IDを無線中継器の制御部407が認識すると、制御部407がこのスロットを使用する直前に、アンテナ切り替えスイッチ405を第二のアンテナ106側に切り替え指示し、アンテナ106を用いて通信を行う。図6は、アンテナ切り替えタイミングの決定方法を示すフローチャートである。

【0029】通信を開始する時、アンテナ切り替えスイッチを無線基地局用アンテナ側に設定(601)し、無

\*図である。

【図2】本願発明の無線端末の構成図である。  
 【図3】本願発明の無線基地局の構成図である。  
 【図4】本願発明の無線中継器の構成図である。  
 【図5】本願発明のフレーム構成図である。  
 【図6】本願発明のアンテナ切り替えタイミング決定のフローチャートを示す図である。

【符号の説明】

- 101…既存通信網
- 102…交換機
- 103…無線基地局
- 104…無線中継器、
- 105…第一のアンテナ
- 106…第二のアンテナ
- 107…無線端末
- 405…アンテナ切り替えスイッチ

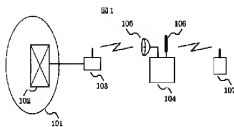
[0030]

【発明の効果】以上説明したように、本願発明によれば、無線中継器がアンテナを無線基地局用と無線端末用の2系統具備することにより、干渉等による周波数利用効率の低下を防ぎ、より多くの加入者を同一エリア内に収容することが可能となり、通信効率の向上に大きな効果がある。

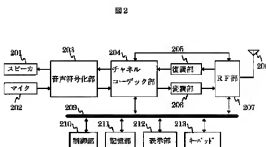
【図面の簡単な説明】

【図 1】本願発明の実施形態の無線中継システムの構成\*

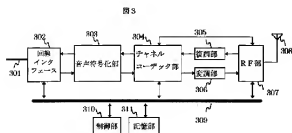
【圖 1】



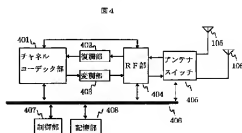
【圖2】



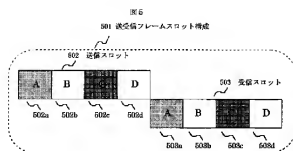
【圖3】



【圖4】



【図5】



【図6】

図 6

